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NEWS

Underwater mining enters new development phase
Page 63

BIOTECHNOLOGY

Commercial consolidation begins
Page 25

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NEWS

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News of the Week

■ **Uniroyal Chemical, wholly owned subsidiary of Uniroyal Inc., is on the selling block.** **Page 4**

■ **NIH okays field test of tobacco plant genetically engineered to be resistant to disease.** **Page 4**

■ **Mary L. Good is ACS president-elect for 1986.** **Page 5**

■ **UCSD neurosciences professor Robert Katzman receives first Achievement Award in Aging in Allied-Signal program.** **Page 6**

■ **Genentech, Lubrizol, and Pfizer agree to produce vitamin C by two-step process involving genetically modified bacteria.** **Page 6**

Business

Monsanto's restructuring program will affect plastics, chemicals, and ag chemicals businesses especially in company's drive to improve its profitability. **Page 13**

The U.S. uranium industry has fallen flat on its face, owing to low demand amd competition from cheap imports. **Page 15**

Oil-field chemicals market has declined significantly in the past few years with drop in drilling activity. **Page 16**

Government

High levels of radon in homes in some areas lead to EPA and state programs to monitor the radioactive gas. **Page 18**

Need for acid rain emission controls endorsed by American Public Power Association, a group that is made up of publicly owned utilities and is a member of the Acid Rain Roundtable. **Page 20**

Technology

Marine miners will emphasize science to improve their efforts to uncover marine minerals, to gain a better understanding of the oceans, and to develop tools for undersea mining. **Page 63**

International Fertilizer Development Center plays important role in increasing food supplies in developing countries. **Page 67**

Cover: Culture room in Damon Biotech's cell culture facility, which produces monoclonal antibody in 40-L reactors

Product Report

Character of the biotechnology industry is about to change: It will comprise some of today's biotech firms as well as established chemical and drug companies. **Page 25**

Letters 2
Editor's Page 3

Concentrates
Business 8
Government 17
Science/Technology 61

The Departments
New Products 54
Meetings 70
Newscripts 84

order of Lasso or Roundup." He indicates, however, the unlikelihood of coming up with the blockbuster type of product that these have been.

Further adding to Reding's problem of declining profitability is the suffering agricultural economy, which has caused farmers to cut back on planting and the resultant use of herbicides. "I just don't see the farm economy improving much in the next five years," he says.

To help counter the effect of this trend, Reding says agricultural chemical operations are being split into three profit centers—animal science, plant technology, and agricultural chemicals. And agricultural chemicals will be split into North American and foreign.

In R&D, Monsanto has mainly two focuses—plant technology and animal health. Its big hope in animal health products is its bovine growth hormone currently being tested. The hormone will not be used to make bigger cows as such, but rather to make milk production more efficient. In plant sciences, Monsanto currently has three programs—crop improvement, microbials, and wheat hybridization. It is the wheat program that Reding says will have the earliest payout, but even that will not be until late in the decade.

William Storck, New York

Uranium industry continues in doldrums

The U.S. uranium mining and milling industry is "nonviable." So says John S. Herrington, Secretary of Energy, who is required by law to determine the state of the industry's health.

But people in the industry didn't need an official pronouncement of nonviability to know that they were in big trouble. After years of heavy investments in the face of a declining market and sharply lower selling prices, the industry's bottom line gave it to them straight. Last year, the industry lost $205 million.

The big question now is why. Why did a promising domestic uranium industry fall flat on its face? Some experts are looking beyond the obvious—curtailed demand, low prices, cheap import competition, and huge inventories—to other, more subtle reasons. They are pointing their fingers, not only at the utilities that buy uranium to fuel their nuclear power plants, but at the public utility commissions (PUCs) that control the utilities.

John W. LaFond, executive vice president of SWUCO Inc., insists that some of the most serious uncertainties facing uranium-buying utilities in the U.S. are the second guesses state PUCs make on their buying decisions. Concern over future PUC actions, which borders on paranoia at times, has driven many prospective buyers to insist on long-term arrangements with market-based or spot-based pricing. Such terms, or even the spot market itself, says LaFond, make utilities seem relatively safe from future PUC criticism, especially when ratemaking decisions are being made.

Prices related to the spot market may be safe for dealing with PUCs, says LaFond. But, he told a recent meeting of the Atomic Indusrial Forum in Santa Fe, N.M., they run contrary to rational marketing strategy. Such a strategy gives more consideration to the long-term requirements of both the buyer and the seller. These objectives, he adds, are mutually supportive. "There is nothing conflicting about them."

With few exceptions, U.S. uranium producers cannot meet the terms sought by today's U.S. uranium buyers. Thus, in trying to placate their PUCs, U.S. utilities are "fostering the demise of the U.S. uranium industry," LaFond says. This, he adds, leads necessarily to increasing reliance on foreign suppliers.

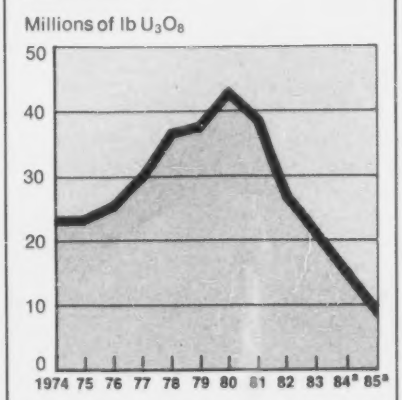
Even the PUCs, LaFond suggests, might not like such a situation if they were completely aware of the facts. The problem is that because of the PUC-utility adversarial relationship, the PUCs wouldn't believe the utilities if they explained it to them. Instead, he urges that domestic uranium producers themselves take their case directly to the PUCs.

Gunther Lurf agrees that most U.S. utilities would benefit over the long haul by long-term uranium contracts. But Lurf, who is president of NUKEM Inc., concedes that the way the uranium market has developed recently raises doubts about the advantage of signing these contracts.

Over the past two years, utilities have been able to buy even large volumes of uranium on the spot market for half the world average price set by long-term contracts. It's not surprising, then, that buyers are moving away from long-term contracts and into the spot market.

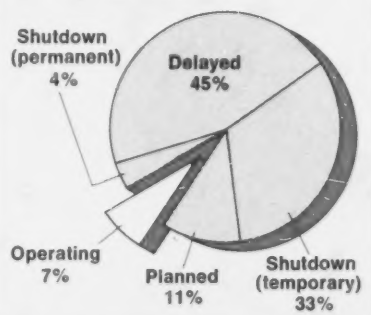
During the first nine months of the year, more than 13 million lb of uranium (as U_3O_8) was traded on the spot market, NUKEM records indicate. That's 20% of all the uranium produced in the western world. Traditionally, the spot market amounts to only 10%, says Lurf.

U.S. uranium production plummets



a Colorado Nuclear Corp. estimates.
Source: Department of Energy

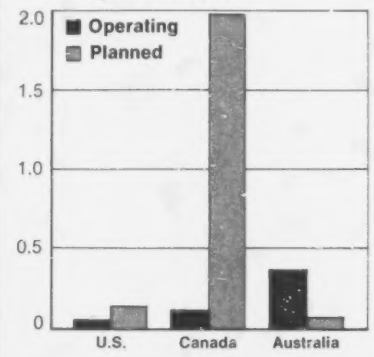
U.S. uranium reserves: not much operating



Total recoverable U.S. reserves = 1.062 billion lb

Source: Rocky Mountain Energy Co.

Canadian uranium ore will be top grade



Source: Rocky Mountain Energy Co.

He, too, blames PUCs, which have forced some utilities to abandon long-term contracts, for contributing to the trend. In other countries, Lurf says, the emphasis on spot-market buying is very limited.

In the U.S., however, very few utilities have signed long-term contracts for uranium over the past several years. Indeed, some have canceled existing agreements. In 1980, almost 70% of utilities' 10-year forward uranium demand was covered by long-term contracts. This year, the figure is only 45%.

Such trends are leaving the long-term uranium requirements of U.S. utilities relatively "uncovered"; that is, not under contract. In the U.S., only four years' worth of supply is under long-term contract, Lurf says. European supply is contracted eight years ahead, whereas in Asia, buyers have contracted for 11 years of forward supply.

Looking ahead to 1995, Lurf estimates that U.S. utilities have covered only 13% of their demand through long-term contracts. Another 20% could come from existing or planned domestic production. But that still leaves two thirds of U.S. uranium requirements uncovered. Asia has more than 70% of its needs covered, and Europe has an excess supply. Lurf warns that, although spot market uranium may be cheaper than material under long-term contract today, that is not going to hold true in the long run.

Earl Anderson, New York

Drop in drilling hurts oil-field chemicals market

When it was conventional wisdom that the oil shortage and consequent price increases would go on forever, it was also accepted thinking that oil-field chemicals was the market to be in. But events in the past few years have proven that notion faulty, and oil-field chemicals have fallen on hard times as drilling activity declines. The consumption of oil-field chemicals is directly related to drilling activity, and two new studies point out how far that market has declined and where opportunities still exist.

U.S. drilling activity has dropped significantly over the past several years, with a concomitant drop in the market for all kinds of oil-field chemicals, notes a study by Frost & Sullivan, New York City-based consultants. On the other hand, there are still opportunities for marketers of oil-field chemicals in developing countries, particularly nonmembers of the Organization of Petroleum Exporting Countries, predicts a new survey by C. A. Houston & Associates of Mamaroneck, N.Y.

According to Frost & Sullivan, the rig count in the U.S. began dropping early in 1982, and although drilling activity spurted briefly in 1983, a further slowdown began last year. The result has been an oil-field chemical market that has shrunk from an estimated $1.43 billion in sales in 1981 to about $1.14 billion last year. The decline has affected both the companies that actually supply chemicals and services for drilling, cementing, stimulation, completion and production, and the hundreds of chemical and mineral producers who, in turn, supply them.

And though the study predicts a return to growth, it will be only very modest growth over the next few years. Indeed, the study predicts that the demand for oil-field chemicals in 1989 will not have recovered to the 1981 peak levels. "This market reflects the imbalance of domestic gas and oil pricing and demand, uncertainty over tax reform, and low crude oil prices," says the company. Moreover, any changes in OPEC pricing, or the level of political turmoil in the Middle East, would alter projections for the oil-field chemicals market.

These same factors certainly are affecting the consumption of oil-field chemicals outside the U.S., agrees the report by Houston. However, unlike the U.S., ambitious exploration and development programs in developing countries will cause consumption of these chemicals to rise sharply, as these countries attempt to cut their dependence on foreign oil imports, and increase their own crude-oil exports. And most of the growth, Houston adds, will be in non-OPEC countries.

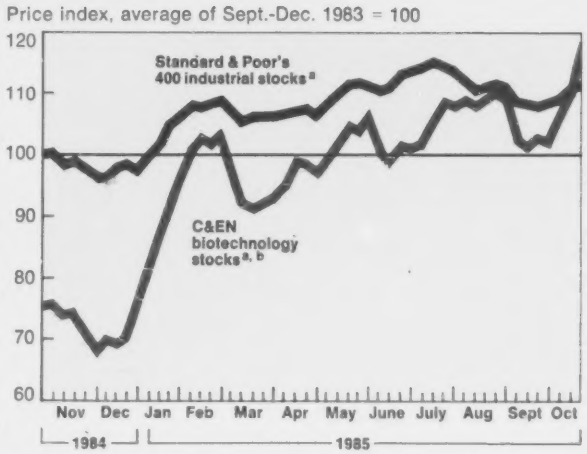
Oil-field chemical sales outside North America will grow to an estimated $3 billion by 1993 from $2.1 billion last year, the study predicts. The most promising market segments over that time will be in well stimulation, production, and completion and workover chemicals, with annual growth rates of 5 to 8%, as oil companies try to maximize production from existing wells.

Additionally, stimulation chemical use likely will grow especially well in areas where output is reaching maturity, or where gas production is being emphasized, such as in the U.K. sector of the North Sea, and in Australia. And production chemicals will show steady growth, as more and more water is produced per barrel of oil.

Price pressures, however, will temper some of the growth. According to Houston, the pressures will be significant in areas such as the North Sea, Saudi Arabia, Nigeria, and Indonesia.

Given the growth facing the industry in areas outside North America, there are opportunities to introduce new oil-field chemicals and technology, and also opportunities to enter the market via the acquisition route, Houston says. In countries pushing oil development programs, the markets "are still open and can be entered if action is taken relatively soon," the company says. However, "attractively priced acquisition candidates and other market entry opportunities likely will disappear within three to five years." □

Biotechnology stocks have overtaken the stock market with recent surge . . .



a Reindexed to average for Sept.-Dec. 1983 period to show relative change. Prices as of Friday close each week. b Based on stock prices for Amgen, Applied Biosystems, Biogen, Centocor, Cetus, Damon Biotech, Genentech, Genetic Systems, Genex, Hybritech, Molecular Genetics, and Monoclonal Antibodies.

. . . but individual stock performance reflects companies' varying fortunes

Company	Latest price[a]	% change[b]	52-week range High	52-week range Low
Amgen	$10¾	139%	$10¾	$ 3¾
Applied Biosystems[c]	24⅝	69	27⅜	13⅜
Biogen	11½	64	11½	4¼
Bio-Response	6¾	12	9⅜	3⅝
California Biotech	10¾	72	12	4¼
Centocor	20	90	20¾	8
Cetus	15¼	51	16¾	8⅝
Chiron	9¼	90	10⅛	4¼
Collaborative Research	3⅞	−14	6¼	2¾
Damon Biotech	6½	37	7⅝	4⅛
DNA Plant Technology	8⅞	73	9	3⅜
Genentech	48⅝	51	56½	28¾
Genetic Systems[d]	9¾	39	9⅞	5
Genex	1¾	−80	10⅛	1⅜
Hybritech[e]	27⅝	86	30	14
Molecular Genetics	7¼	0	10¾	6
Monoclonal Antibodies	16¾	56	16¾	7¾

a As of close on Friday, Nov. 1, 1985. b Nov. 2, 1984, to Nov. 1, 1985. c Adjusted for 2-for-1 stock split in March 1985. d To be acquired by Bristol-Myers, pending shareholder approval. e To be acquired by Eli Lilly.

Remember when investment decisions about biotechnology stocks were made by gauging cosmic promises and counting Nobel Laureates? Things have changed somewhat. True, price-to-earnings ratios, the yardsticks dearest to analysts, remain nominal and few among the public companies using biotechnology. And products, particularly those made with recombinant technology, remain scarce. Nonetheless, the investment community, having lost faith in the companies' stocks for much of 1984, now senses a new solidity in the basis for its decisions. The result: a year-long surge in biotechnology stock prices that has culminated in the past month in 52-week highs for several issues.

This reborn investor enthusiasm has a number of sources. Products based on monoclonal antibodies are having great success in the medical diagnostics market. Indications of commercial survivability, such as joint ventures and other long-term agreements, are more common than before. At many firms, losses are narrowing and disappearing. Even FDA's approval of Protropin, Genentech's genetically engineered human growth hormone, though it will neither make nor break the company, has a symbolic power of assurance.

But the most concrete measures of the payoff potential of biotechnology stocks are two agreements made this fall: Eli Lilly's decision to buy Hybritech, and Bristol-Myers' decision to buy Genetic Systems, both in the $300 million range. Such developments light fires under investors.

Both to-be-acquired companies have concentrated on monoclonal antibody technology, so investors turned in October to two other hybridoma-based firms, Centocor and Monoclonal Antibodies Inc. Per-share prices for each reached 52-week highs late last month.

The surge also has elevated shares in such genetic engineering firms as Cetus, Biogen, and Amgen to 12-month high points during the past month. Each has reported management, business, and scientific developments this fall that have pleased the market. Most of the better-known biotechnology issues, in fact, have risen sharply over the past 12 months, lifting their composite value on Nov. 1 to 56% above the year-ago level and 17% above the average value for late 1983, when C&EN began tracking the stocks.

Not all the biotechnology stocks fared so well between Nov. 2, 1984, and Nov. 1, 1985. The per-share price for Genex plummeted after the company lost a vital contract in April, and remains mired 80% below its year-earlier level. Collaborative Research's market value has fallen 14% over the past 52 weeks. And Molecular Genetics' stock price has been flat.

day would have left them with too much going for them and not enough cash," she says.

So enter Bristol-Myers. Like Lilly, Bristol-Myers lacks a window on the fast-growing diagnostics sector. But attractive as the diagnostics business might be, it was probably not the chief reason Bristol decided to buy. "Bristol bought Genetic Systems for its therapeutic research capability," says Parag Saxena, a Citibank assistant vice president in charge of that institution's emerging health care fund. For one thing, he points out, Genetic Systems' diagnostics for sexually transmitted diseases are licensed to Syntex except for its test for the acquired immune deficiency syndrome (AIDS) antibody. "But Bristol-Myers is not paying nearly $300 million for an AIDS diagnostic," Saxena says. "If it had wanted that, it would have bought another firm instead.

"Bristol-Myers is really paying $300 million for being behind in therapeutic research," he says. "There are enough clinical data now to be able to say that this science is